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ABSTRACT

This study examined the relationship between family structure, expenditures on education, and children's educational outcomes for black South Africans, using the nationally representative 1995 October Household Survey. The analyses focused on 28,215 individuals, ages 10 to 24 years, who had not completed secondary schools. The findings indicated that although enrollment levels were high for most ages, schooling advancement rates were well under one grade per year, suggesting high rates of grade repetition. Controlling for background factors, family structure was highly correlated with educational outcomes. The strongest effects were seen for children living with neither of their genetic parents, who were less likely to be enrolled in school, had completed fewer grades, were older for their grade if enrolled, and had less money spent on their school fees and school-related transportation costs than children living with both genetic parents. Children who lived with single mothers were also disadvantaged for most measures. Family structure played a strong role in the probability that a child was enrolled in school; additional effects were evident, although diminished in strength, for outcomes affecting only enrolled students, age delays for grade, and financial expenditures on schooling. In addition, past academic progress influenced expenditures on school; children who were behind in school for their age (indicative of previous grade repetition) had less money spent on their schooling, above and beyond the effects of family structure on schooling expenditures. The findings suggest that family structure is an important contributor to educational inequality in South Africa, although there are important caveats regarding self-selection into different family types, as well as issues of school quality. (Contains 63 references.) (Author/KB)

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Kermyt G. Anderson

Family Structure, Parental Investment, and Educational Outcomes among Black South Africans

Report No. 00-461

Research Report

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Family Structure, Parental Investment, and Educational Outcomes among Black South Africans

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Abstract

This paper examines the relationship between family structure, expenditures on education, and children's educational outcomes for black South Africans, using the nationally representative 1995 October Household Survey. The analyses focus on 28,215 individuals ages 10 - 24 who have not completed secondary school. The results show that although enrollment levels are high for most ages, schooling advancement rates are well under than one grade per year, suggesting high rates of grade repetition. Controlling for background factors, family structure is highly correlated with educational outcomes. The strongest effects were seen for children living with neither of their genetic parents, who were less likely to be enrolled in school, had completed fewer grades, were older for their grade if enrolled, and had less money spent on their school fees and school-related transportation costs, than children living with both genetic parents. Children who lived with single mothers were also disadvantaged for most measures. Family structure plays a strong role in the probability that a child is enrolled in school; additional effects are evident, though diminished in strength, for outcomes affecting only enrolled students, age delays for grade and financial expenditures on schooling. In addition, past academic progress influences expenditures on school; children who are behind in school for their age (indicative of previous grade repetition) have less money spent on their schooling, above and beyond the effects of family structure on schooling expenditures. The results suggest that family structure is an important contributor to educational inequality in South Africa, although there are important caveats regarding self-selection into different family types, as well as issues of school quality.

Datasets used

October Household Survey (OHS), South Africa, 1995

Introduction

The determinants of educational outcomes and the effects of education on employment, income and life histories continue to be important areas of research in both developed and developing countries. These relationships are of particular interest in the Republic of South Africa, which has one of the world's highest rates of wage inequality (Lam 1999, Leibbrandt et al. 2000). With the transition to a non-racial democratic government in 1994, much rhetoric and energy have been devoted to reducing this inequality, and to healing the damage wrought by decades of racial discrimination under the policies of Apartheid. However, economic inequality is likely to continue in the new South Africa as long as educational inequality persists. This paper presents an examination of some of the factors influencing educational outcomes, focusing in particular upon the relationships between children's family structure, their current educational status, and their families' expenditures on their educations.

Education and economic outcomes

The correlation between measures of an individual's human capital (such as education, or parental education and income) and his or her economic outcomes (employment, wage income, etc.) is well documented across a variety of cultural settings (e.g., Becker 1993, Filmer and Pritchett 1999, Lam 1999). In South Africa, this relationship is complicated by the confounding issue of race, which has influenced access to both educational and employment opportunities. From 1948 until 1990, the government of South Africa followed the policy of Apartheid ("separateness"), with the goal of enforcing and increasing the de facto racial segregation that existed in the country.[1] The Apartheid government recognized four racial categories: African (a.k.a. black), coloured, Indian (a.k.a. Asian), and white. Legislation was enacted to enforce racial segregation; as a result, the quality of employment, education, housing and other opportunities varied greatly across racial groups, with whites having the greatest access to resources and blacks, the least. During the Apartheid era, education for blacks was controlled by as many as 11 different school administrations (Case and Yogo 1999); schools for blacks were typically underfunded, and had far less money per pupil than white schools (Thomas 1996). Although Apartheid laws were suspended by the early 1990s, and the diverse educational administrations were collapsed into a single ministry in 1994 (Moll 1998), at the present time many schools are still racially homogeneous, and their quality and resources continue to vary greatly by race. Variation in the quality of schools affects children's educational pathways; for example, regional student/teacher ratios affect the probability of enrollment in school, the highest grade completed, the probability of employment, and wages earned (Case and Deaton 1999, Case and Yogo 1999). Student/teacher ratios are much higher in black communities than white ones; furthermore, schools that are primarily African have fewer facilities such as libraries, laboratories and sports facilities (Case and Deaton 1999).

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[1] Apartheid laws were largely abolished by 1990, and democratic non-racial elections were held in 1994 and 1999. From 1990 until 1994 South Africa was ruled by an interim government, composed of members of the old government and members of formerly banned opposition parties, most notably the African National Congress, which was the primary winner in the subsequent national elections.

The inherent inequality of the so-called Bantu education system, and the perception that they were being trained for a lifetime of servitude in South African society, led to widespread protests against and boycotts of schools by blacks during the 1970s and 1980s. When the Apartheid education system finally ended, it was clear that blacks had lower numeracy and literacy skills than the other racial groups (Moll 1998). Although educational attainment increased for all races throughout the Apartheid years (Lam 1999, Thomas 1996), the highest grade completed (the standard measure of educational attainment in South African datasets) continues to vary by race, with whites and Indians reaching the highest grades, blacks the lowest, and coloureds reaching intermediate levels (ibid.).

Inequality in educational opportunities and outcomes has important implications for inequality in employment and earnings. Strong correlations exist between parental education and offspring education in South Africa; the more education a resident parent has, the more schooling the offspring had completed (Lam 1999; Thomas 1996, 1999).[2] The relationship between education and income is also strong; each additional grade an individual completes results in an impressive increase in that individual's wage income (Lam 1999). The relationship between education and income suggests that increasing educational attainment may be an effective way of reducing racial inequality in South Africa (Moll 1998, Mwabu and Schultz 1996).

Although the current constitution of the Republic of South Africa (adopted in 1996) guarantees education as a right, it is not free. In addition to the direct costs of school fees (tuition), students and their families must cover the indirect costs of books and supplies, school uniforms, and often transportation to school as well. Poorer families, who are disproportionately represented among non-whites (Klasen 1997), are less able to afford the costs of education. Thus, the legacy of Apartheid has left profound effects on the educations and skills of the majority of South Africa's citizens.

Family structure and educational outcomes

Apartheid legislation had powerful and long-lasting effects on family structure, especially for blacks. The Group Areas Act of 1954 circumscribed members of each racial group to living within certain restricted areas of the country, as well as within specific regions of major cities. Blacks were relocated to quasi-independent "homelands"; they were allowed to work in cities within South Africa on one year contracts only, and were prohibited from bringing their spouses and children with them (Jones 1993, Reynolds 1989). As a result, African adults were often forced to seek employment and to live apart from their spouses and families. Blacks living in cities within South Africa proper were restricted to townships, small ghettos that generally had inferior housing, utilities, public facilities, etc. Zoning laws and poverty resulted in extreme housing shortages for blacks in South African cities (Jones 1993, Younge 1982), and many blacks still live in homogenous, underdeveloped communities (Saff 1996).

This legislation undoubtedly contributed to a general shift among Africans to increased complexity in household organization (Jones 1998, Niehaus 1994, Preston-Whyte and Zondi

[2] The relationship between parental and offspring education in South Africa has been examined only for households in which children reside with a parent. Current datasets do not allow assessment of the effects of parental education on the many children who live with neither biological parent.

1992, van der Vliet 1991). As a result of migratory labor patterns and restrictive housing options, women often became de facto heads of household, especially among women who had moved to cities. Migratory labor patterns meant that one or both of a child's parents were often not present for much of the year, even if they were considered to be current members of the household (Case and Deaton 1998, Reynolds 1984, Siqwana-Ndulo 1998), and many households came to depend heavily on financial remittances sent in from family members employed elsewhere (Leibbrandt et al. 2000, Posel 2000). In part due to migratory labor patterns, divorce and non-marital births increased greatly in South Africa during the Apartheid era (Burman and Fuchs 1986, Burman and van der Spuy 1996, Simkins 1986, Thompson 1990), and parents began to rely increasingly on family members other than spouses for support with the household economy and with raising children (Niehaus 1994). These changes in household structure in South Africa have been correlated with negative consequences on children's health and survival (Burman 1986, Cock et al. 1986, Jones 1993). For example, illegitimate children in African households are less likely to receive support from other family members (Burman 1992). During the late 1980s, caretakers of illegitimate African children were much less likely to receive government maintenance grants, and the grants they received were much lower than those received by other racial groups (Simkins and Dlamini 1992).

Changes in family structure can have negative effects on children's educational outcomes as well. Numerous studies in the United States have shown that children who live with two genetic parents have higher educational achievements than children living in other family arrangements (e.g., Blibarz and Raftery 1999, Cooksey and Fondell 1996, Downey 1995, Haveman and Wolfe 1995, Pong 1998, Powell and Parcell 1997, Zvoch 1999). The effects of not living with both genetic parents on a child's education may vary across different forms of family structures. One-parent households have lower incomes than two-parent households, and in addition the resident parent may have less time available for children; thus, negative effects of one-parent households may be in part due to a decrease in the overall financial and time budget available for parental investment, or to other background factors such as ethnicity or parental education (Downey 1995). However, decreased income does not entirely explain the negative effects of alternative household structures on educational outcomes. For example, although American stepfamilies often earn as much as two-parent biological households (McLanahan and Sandefur 1994, Thomson 1994), stepparents have less incentive to invest in stepchildren than in biological children because they are genetically unrelated to them (Daly and Wilson 1988, 1998). Stepparents across a variety of cultural settings have been shown to spend less time with and less money on stepchildren than genetic parents (e.g., Amato 1987, Anderson, Kaplan and Lancaster 1999, Anderson, Kaplan, Lam and Lancaster 1999, Case et al. 1999, Cooksey and Fondell 1996, Downey 1995, Flinn 1988, Hofferth and Anderson 2000, Marsiglio 1991). Children are also likely to receive fewer resources or less care if their primary caretakers are unrelated individuals, or more distant relatives (such as aunts, uncles and grandparents) (Daly and Wilson 1988, 1998; see also Case and Paxson 2000). Thus, children living in households headed by at least one non-relative, or a more distant relative, may experience decreased levels of involvement and investment than they would receive if living with both genetic parents. In addition, children living with non-relatives or with more distant kin may have experienced or be experiencing higher levels of stress (e.g., Flinn and England 1995), both from past conflicts resulting in the breakup of their family units and also as an indirect result of current conflicts within the

household over the allocation of household resources. Taken together, these factors may detrimentally affect the educational accomplishments of children in alternative family structures.

Although both theoretical and empirical work points to the influence of family structure on educational outcomes, this relationship has not been examined in detail in South Africa. As noted above, the prevalence of non-traditional family structures has increased in South Africa in recent decades. Yet, few studies have addressed the effect of family structure on education. Cherian (1989, 1994) contrasts standardized test scores of children living in two-parent and single-parent households, using a sample of Xhosa children from the Transkei (which was recognized by the Apartheid government as an "independent" African homeland); in these studies, children from two-parent homes have higher scores than children from single-parent families (Cherian 1989). Other researchers have indirectly examined the relationship between family structure and children's education in South Africa, though this was not the primary focus of their research. Fuller and Liang (1999) report that African girls from father-absent households are less likely to drop out of school than girls from father-present homes. Case and Deaton (1999) report that, controlling for income and other confounders, residing in a female-headed household has no significant effect on completed education for whites, but has significant positive effects on completed education for Africans. They also report that Africans aged 8 to 18 from female-headed households are more likely to be enrolled in school than those from male-headed households.

Thus, the evidence on household structure and educational outcomes in South Africa is meager, and somewhat contradictory to the results found for North American samples. Whereas being from a female-headed household is associated with negative educational outcomes in the United States, in some studies it appears to confer positive effects among black South Africans. However, the previous results reported are at best indirect measures of the effects of household structure on education. Cherian (1989, 1994), for example, does not address stepparent households, or households in which children reside with neither parent; it is not even clear whether two-parent households were restricted to households with two genetic parents. And the indicator variable "female-headed household," as used by Case and Deaton (1999), does not necessarily correlate with the presence or absence of either parent, as African children commonly live with one or more grandparents (e.g., Moeno 1977, Case and Deaton 1998). Additionally, the studies of Case and Deaton (1999) and Fuller and Liang (1999) do not distinguish between stepparent households and households with both genetic parents present. The question of how and to what extent family structure influences educational outcomes in South Africa has yet to be adequately addressed.

Financial expenditures on education

Education is not free in South Africa; in addition to the direct costs of school fees, students or their families face additional expenses such as uniforms, school supplies, transportation costs, etc. There is also great variation in how much money schools charge for attendance. I know of no official figures on school fees, but personal experience in the Western Cape suggests that they can vary by several orders of magnitude, from as little as 50 rands (about eight U.S. dollars) to 6,000 rands (about $1000) and above, depending in part on the quality of the school. If family structure influences children's enrollment status, then it will indirectly influence expenditures on

education, as children must be enrolled in school in order for families to spend money on school fees. Family structure may also directly influence expenditures on schooling, if parental figures who are not biological parents are less willing to pay for children's schooling. In Cape Town, family structure has been shown to correlate with men's expenditures on education for Xhosa high school students, with coresident stepfathers and never-coresident genetic fathers each spending less than currently coresident genetic fathers (Anderson et al. 1999a). In the United States, family structure has been shown to influence expenditures on or savings for higher education as well (Anderson et al. 1999b, Zvoch 1999).

Additionally, we expect to see a relationship in South Africa between children's past educational history and their families' financial expenditures on schooling. The quality of schooling varies greatly in South Africa (Case and Deaton 1999, Case and Yogo 1999), and much of the variation in financial expenditures on schooling is probably due to the relationship between the cost and the quality of school. Case and Yogo (1999) have shown that measures of regional school quality correlates with adult income and probability of employment. All else being equal, then, families that spend more on education can expect greater returns to education for their children. However, families should be less willing to spend money on schooling if their children are less likely to benefit from these expenditures. Grade repetition is common in South Africa, with the result that black South Africans are enrolled in primary and secondary school at much later ages than is typical in the United States (Case and Deaton 1999, Fuller and Liang 1999). As a result, many students are "delayed" for their grade—that is, grade repetition has resulted in these students being older than they would otherwise be, and often much older than some of their peers in the same classroom. In one study of urban Xhosa in Cape Town, Anderson, Kaplan and Lam (2000) showed that students who were older for their grade had lower test scores and were more likely to fail at the end of the year. Since prior failure predicts subsequent failure, we expect children who are older for their grade to have less money spent on their schooling. The causal direction for this relationship is not entirely clear—children who are behind for their grade may be delayed in part because their families have always spent less on their schooling, and thus their entire educational histories have been substandard. Controlling for household characteristics that are likely to correlate with previous educational investment, we expect that children who are behind for their grade will have less money current spent on their educations.

Methods

The 1995 October Household Survey dataset

The data used in this paper are drawn from the 1995 October Household Survey (OHS) collected by Statistics South Africa, the national statistical agency (formerly the Central Statistical Service). This national survey used stratified random sampling to collect data from 130,787 individuals in 29,700 households. The current analyses focus on black (a.k.a. African) students, who comprise the bulk of the population and of the survey (92,835 individuals in 19,099 households in the OHS). All analyses presented in this paper are restricted to black South Africans ages 10-24. One drawback the OHS shares with most South African datasets is that it collapses the lower three levels of education (grades 1 through 3) into a single level. Thus, we cannot distinguish between individuals whose highest completed level of education is grades

one, two or three (or who are currently enrolled in the second, third or fourth grades). To minimize the effects of noise or error introduced by this coding scheme, individuals less than age 10 have been dropped. At the time of the OHS survey, primary and secondary education in South Africa consisted of twelve levels: Sub A, Sub B, and Standards 1 through 10. Recently these levels have been renamed grades 1 through 12, which will be the terminology used here. At the end of the final year of secondary school (Standard 10/Grade 12), students are assessed via a standardized national matriculation examination (the "matric" exam), which determines whether or not they pass high school, as well as whether they are eligible to pursue higher education.

Two subsamples from the October Household Survey will be used for analysis. The full sample includes all individuals ages 10 to 24 who have not graduated from high school (e.g., not completed standard 10/grade 12/matric), and will be used to assess the probability of current enrollment and the highest grade completed for all persons at risk of being in primary or secondary school. The enrolled sample is restricted to students who are currently enrolled, and will be used to examine years delayed in school, as well as financial expenditures on the student's school fees, travel to school, and other (miscellaneous) school costs. Table 1 presents mean and variance statistics for both the full and enrolled samples. I will now briefly describe the variables used in the analyses before progressing to the results.

[Table 1 about here]

Educational outcomes

This paper presents analyses of three measures of educational achievements that are available in the OHS; the first two use the full sample while the third draws upon the enrolled sample. Current enrollment measures whether or not a child who has not yet completed matric (twelfth grade) is currently enrolled in school.[3] Highest grade completed measures a child's completed educational level, for both currently enrolled and non-enrolled children. (Due to grade repetition, this measure is not necessarily equivalent to the number of years of schooling, although they two terms are often used interchangeably; see Anderson et al. 2000.) Lastly, years delayed measures the number of years that currently enrolled students have been delayed in their educational progression, e.g., how far behind they are for their current grade. For example, an eighteen year old student enrolled in the twelfth grade is zero years delayed; a nineteen year old in the twelfth grade is one year delayed; a twenty year old student is two years delayed, etc. Similarly, a twelve year old in the sixth grade is zero years delayed, a thirteen year old in the same grade is one year delayed, and so forth. (Because the OHS collapses the three lowest completed grades into a single response level, we cannot calculate years delayed for children who have completed grades one through three, e.g., who are currently enrolled in grades two through four.) Being delayed in school occurs for primarily three reasons: the student started school later than other children; the student repeated a grade due to failing the previous year, withdrawing from school midyear, changing school districts, etc.; or the student did not enroll in school for one or more years before resuming school. In a survey of Xhosa high school students in Guguletu (a black township in Cape Town), Anderson, Kaplan and Lam (2000) found that grade repetition was responsible

[3] The pursuit of higher education beyond the matriculation exam is an important area deserving research, but will not be examined here. Students who have completed matric are not included in the sample because they are not considered at risk of attending primary or secondary school.

for most of the variance in years delayed (see also Jones 1993). Anderson et al. (2000) also found that students who were older for their grade received lower test scores and were more likely to fail at the end of the year. Thus, the number of years delayed is a proxy measure of a student's previous educational history, and is a predictor of subsequent educational success or failure. In addition to modeling years delayed as an outcome of family structure, this paper will also examine the extent to which years delayed is a predictor of household educational expenditures.

Educational expenditures

The 1995 OHS contains measures of three types of annual educational expenditures on currently enrolled students: 1) household expenditures on the student's school fees/tuition; 2) expenditures on transportation to school; and 3) other miscellaneous school expenditures (books, uniforms, boarding, etc.). These measures vary across students within the same household, but we cannot specify who within the household provides the money, or makes the decisions about allocating it to the student. As Table 1 shows, many households spend nothing on each of these categories; even school fees are completely unpaid for over 10% of children. Some families may not pay school fees because their children have bursaries or scholarships, but no information is available about whether a student receives such support. Personal communication from principals in township primary and secondary schools in the Western Cape suggests that students are generally not expelled if their families cannot afford to pay the school fees; realizing the importance of education, schools are reluctant to deny schooling to disadvantaged children. For the purposes of analyses, the expenditure variables have been logged (with values of zero rands replace by 0.9 rands, to retain them as the lowest [censored] value in the sample), and will be analyzed using tobit analysis to account for censoring in the dependent variable.

Family structure

The family structures of children have been grouped into six categories: living with both genetic parents; living with a single mother; living with a mother and a stepfather; living with a single father; living with a father and a stepmother; and living with neither genetic parent.[4] Family structure is thus defined for the purposes of this paper solely with respect to the presence/absence of genetic parents and/or stepparents; co-residency with other family members (such as grandparents, aunts or uncles) is not analyzed here, but will be the focus of subsequent research.

Household characteristics and socioeconomic status

In order to understand more fully the relationship between family structure and educational outcomes and expenditures, a number of other variables will be included in each model to control for socioeconomic status and other background characteristics. For household

[4] Stepparents are not explicitly defined in the OHS dataset. Their presence has been inferred when a child is identified in the household roster as living with only one parent, but that parent is currently married to someone who is a member of the household. There is therefore a risk that stepparents have been undercounted, if a resident stepparent was recorded as the child's mother or father in the interview. This is a general limitation inherent in many survey instruments, which often group genetic, step and adopted children into the single category of "own" children (Moorman and Hernandez 1989).

characteristics, variables are included to denote the number of persons in each household in different age classes (age 0 - 5, 6 - 17, 18 - 25, 26 - 60 and older than 60), as well as the number of household members whose primary activity is paid work, the monthly household income, and whether or not anyone in the household has completed matric. Additional dummy variables indicate whether or not the household occupies a house or a formal dwelling (as opposed to a traditional dwelling/hut or informal dwelling/shack), whether the household is in a rural area, and whether the household has an indoor water tap, is connected to electricity from the public supply, or has a telephone. This combination of household wage labor participation, educational attainment and services/commodities should provide a reasonable proxy for a household's long-term socioeconomic status.

Other variables

In addition to the variables listed above, each model will includes the child's current age (treated as a series of dummy variables, with age ten being the baseline category), the child's gender (as a dummy variable indicating whether the child is male), and dummy variables for the province in which the household is located.

All analyses were performed using the survey procedures for least squares, logit and tobit regression in STATA v. 6.0. These procedures calculate robust standard errors that take into account the multistage sampling design of the survey, including the correlations of households within provinces and within primary sampling units. The analyses were weighted with the weights provided in the dataset.

Results

Descriptive statistics

Enrollment in primary or secondary school decreases with age for children and young adults in the full sample, although the relationship is not linear (Figure 1). One striking feature of this plot is that enrollment rates are fairly high at all ages. School participation is almost universal through age 15, and remains above 80% through age 18. Enrollment remains high at later ages: approximately two-thirds of 20 year olds, almost half of 22 year olds, and over a quarter of 24 year olds in the full sample are enrolled in school.

[Figure 1 about here]

Figure 2 presents educational attainment by age. The highest grade completed increases for all persons in the full sample in a roughly linear fashion until age 17, after which it remains roughly constant at about an eighth grade education. For enrolled students, the current grade rises across all ages, though not as sharply past age 18. Additionally, the number of years that students are delayed in school increases at all ages, and at a greater rate after age 18. An important point that can be inferred from Figures 1 and 2 is that grade repetition is very common among African students. Enrollment is nearly universal from ages 10 through 15 (Figure 1), yet currently enrolled students advance just over three grades during those six years (Figure 2), suggesting that

they repeat a year for each year they have passed. At higher ages, it is possible that both grade repetition and non-enrollment are both contributing to the increasing age delay of enrolled students. From age 16 to age 24, enrolled students advance barely two grades. Roughly two-thirds of persons in that age group are enrolled in school, suggesting that students might not enroll in school one year for every two they are enrolled. Thus, for the nine year range from 16 through 24, we can infer that black non-high school graduates are typically enrolled for six years; for four of those years they repeat the previous grade, while only two of those years result in the successful advancement to the next grade.

[Figure 2 about here]

If poor academic achievement in the past is a predictor of subsequent academic failure, and if the extent to which a child is behind in school is a result of previous grade repetition, then it is likely that families will spend less on the educations of children who are further behind and are more likely to fail in the future. Additionally, we might also expect a negative relationship between expenditures and outcomes if there is a correlation between current expenditures and past expenditures; children who received lower educational expenditures in the past might have experienced greater failure rates if they were attending poorer quality schools. The relationship between current educational expenditures and number of years delayed is plotted in Figure 3. There is a negative relationship between years delayed and all financial expenditures on education, although the relationship is not linear. Overall, the older a student is for her current grade, the less money her family spends on her school fees, transportation costs, and other school expenses. Note as well that students who are slightly ahead for their grade (negative one and two years behind) appear to have more money spent on their school fees and transportation costs.

[Figure 3 about here]

In addition to varying by age and years behind, schooling outcomes and expenditures also vary by the child's family structure (Table 2). Family structure has the broadest effects on current enrollment in school and on years delayed in school; for these two outcomes, virtually all children not living with both biological parents are less likely to be in school and are further behind for their grade, based on two-tailed Bonferroni multiple comparison tests. Mean expenditures on school fees, transportation to school and other school expenses vary less by type of family structure, suggesting perhaps that family structure has its greatest effect on the probability that a child enrolls in school, and less effect on school expenditures once a child has enrolled. Relative to children living with both genetic parents, children living with neither genetic parent have significantly less money spent on their school fees and transportation expenses; children living with stepfathers also have less spent on their school fees. Interestingly, children living with single mothers have more spent on miscellaneous school expenses, relative to children living with both parents. Overall, children living with neither genetic parent experience significantly poorer outcomes for every variable considered except expenditures on other miscellaneous expenses. Although children who live with neither genetic parent may often be living with a blood relative, the presence of at least one genetic parent is correlated with better educational outcomes, perhaps because they receive greater investment, are more buffered from periods of stress, and so forth.

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[Table 2 about here]

Multivariate models

Logistic regression models of the probability of attending school are presented in Table 3. Model 1 examines the effect of family structure on school enrollment, controlling for the child's gender, age and province of residence; the second model adds household and socioeconomic characteristics, to see if the effects of family structure are independent of the effects of differential socioeconomic factors across family types. With the exception of mother-stepfather households, children from all other types of families are less likely to be in school than children living with both biological parents. These effects remain when household economic and human capital measures are added to the model, and in fact the effect sizes increase for all family types except mother-stepfather households (model 2). Thus, although the child's age, gender, and household socioeconomic status all have important and significant effects on the probability that a child enrolls in school, family structure exhibits additional effects of school enrollment.

[Table 3 about here]

Multivariate least squares regressions of the highest grade completed are presented in Table 4, using the full sample of children ages 10 through 24 who have not competed high school. Family structure has less of an effect on completed grades than it does on enrollment: children who live with neither genetic parent have completed about half a grade less, the only highly significant effect among the different family types (model 1). While children living with either a single mother or a father and stepmother have completed marginally significantly fewer grades when family socioeconomic factors are controlled for (model 2), the significantly negative effect of living with neither genetic parent remains. We also see significant negative effects for living with a single mother, and marginally significant effects for living with a father and stepmother when SES is controlled (model 2). Lastly, because children who have dropped out of school are likely to have completed fewer grades than children who have remained in school (see Figure 2), an indicator variable for current school enrollment is added to model 3. All else being equal, children who are currently enrolled in school have completed about 2.7 more grades than children who are not in school. With current enrollment in the model, the only significant effect of family structure is that children living with neither genetic parent have completed fewer grades. This suggests that family structure may influence grade attainment primarily through the probability that a child attends school, as demonstrated in Table 3; once current enrollment and household socioeconomic factors are controlled, all children living with at least one genetic parent have similar levels of completed education.

[Table 4 about here]

Among children who are currently enrolled in school, family structure is correlated with academic delays: children who live with single mothers, mothers and stepfathers, or with neither genetic parent are older for their grade than children living with both genetic parents (Table 5, model 1). The effects of family structure are less prevalent in this model than in the simple comparison of means (Table 2), suggesting that some of the effects seen in Table 2 were due to differences in children's age, gender, and province. Although Cherian and Malehase (1998)

found no effect of household income on test scores in the Northern Province of South Africa, socioeconomic factors clearly influence academic delays with the national dataset (model 2). Generally, students from larger households or in rural areas are further behind in school, and students from households with higher income or containing one or more high school graduates are younger for their grade. With socioeconomic status in the model, family structure remains highly significant for one group: children who live with neither genetic parent are further behind in school. In addition, children living with either single mothers or single fathers are also behind, at a marginal level of significance. The negative effect of living with a stepfather, which is highly significant when socioeconomic factors are not controlled, loses its significance when SES is in the model.

[Table 5 about here]

Thus far, the results have suggested that family structure does influence schooling outcomes in South Africa, but the effects are stronger for some family types, and in some cases are mediated by household income and other factors. Much of the effect of family structure is seen in the probability that a child is enrolled in school (Table 3); among enrolled students, family structure has less of an effect on grade attainment or age delay, although children who live with neither genetic parent have consistently and significantly poorer academic outcomes. We now turn our attention to household expenditures on school fees, transportation costs, and other school expenditures. Since these children are all enrolled in school, a major selection effect may already have occurred with respect to family structure. In this section we will examine whether family structure influences expenditures on a child's education, above and beyond its effect on enrollment; we will also look at the effect of age delays in schooling (indicative of previous grade repetition) on educational expenditures.

Because over 10% of households report spending no money at all on a child's school fees (Table 2), tobit analysis is used to model expenditures on school fees (Table 6). Analysis of the gross effects of family structure on school fees (model 1) suggest that children living with a single mother, or with neither genetic parents, have significantly less money spent on them than children living with both genetic parents. Living with neither genetic parent remains a significant negative predictor when SES (model 2) and years delayed for grade (model 3) are added to the model, although living with a single mother loses significance. Years delayed in school is also a significant negative predictor of expenditures on school fees, consistent with the relationship plotted in Figure 3; the older a student is for his or her grade, the less money the household spends on his or her education. If years delayed is an indicator of past grade repetition, and if better quality schools cost more, then this result suggests that there is a relationship between current school quality (as measured by the costs of school attendance) and children's prior academic performance. Unfortunately, the cross-sectional nature of the dataset does not allow us to disentangle whether students who have attended better (more expensive) schools throughout their lives fail less, whether families are choosing to send children who have failed previously (and are likely to fail again) to lower quality schools, or both.

[Table 6 about here]

Tobit models of expenditures on school-related transportation costs are presented in Table 7. Most (almost 90%) households spend nothing on transportation (Table 2), presumably because many students live within walking distance of school. Students who pay money to get to school may do so because there is not a school near their home, or because they (or their caretakers) choose not to send them to the closest school (perhaps because the more distant school is one of higher quality). With respect to family structure, there are significant differences in which students receive money for transportation, and how much money they get if they receive any. Children living with single mothers or with neither genetic parent all have less money spent on transportation (model 1), an effect that is robust even after SES (model 2) and years behind for grade (model 3) are added. In addition, students who are older for their grade receive less money for transportation (model 3), perhaps because these students are attending (and have attended) poorer quality local schools, whereas children who receive money for transportation might be attending better quality schools that are a further distance from home.

[Table 7 about here]

Lastly, Table 8 presents tobit models of expenditures on other school-related costs (uniforms, books, etc.). Half of students have some money spent on this category of expenditure, and the average value (in rands) is actually greater than what is spent on school fees (Table 2), so this measure represents an important form of investment in education. Family structure, however, is totally unrelated to expenditures on other school costs, even examining only its gross effects (model 1). Socioeconomic factors have less influence on this outcome than on other types of expenditures; the only highly significant predictors are household income, residence in a rural area, or residence in a house (model 2). Age delay in school is a significant negative predictor of expenditures on other school expenses (model 3); as with school fees and transportation costs, students who are older for their grade have less money spent on their miscellaneous schooling costs.

[Table 8 about here]

Discussion

The empirical results presented in this paper highlight several characteristics of the educational experience of black South Africans. Enrollment rates in primary and secondary school are high, even at relatively late ages. However, educational advancement is less than one grade per year, indicating high rates of grade repetition. While some students remain "on track," many students are delayed in their educational progress, and thus are increasingly older at higher grades. These results suggest that an important fraction of the educational gap between blacks and whites observed in South Africa may be due to higher rates of grade repetition among blacks, rather than extended periods of non-enrollment among blacks, as is sometimes perceived.

This paper has explored the effects of children's family structure on three educational outcomes: their current enrollment status, their highest grade completed, and their number of years delayed in school if enrolled. In addition, the relationships between family structure and expenditures on school fees, transportation to school, and miscellaneous school expenditures were also examined.

There are important issues of self-selection to bear in mind while interpreting these results, as individuals exercise a large degree of choice over the type of family structure in which they (or their children) reside. Nonetheless, we can cautiously draw several conclusions about the effects of family structure on education in South Africa.

For all three measures of educational outcomes, there are strong effects of family structure. The strongest effects are observed for children living with neither genetic parent, who are less likely to be in school, have completed fewer grades, and are further delayed in school if they are enrolled. Living with a single mother is also associated with poorer educational outcomes, though the effect is not as strong as living with neither parent. With the exception of children living with mothers and stepfathers, all children who do not live with both genetic parents are less likely to be in school. Significant effects of family structure on the number of years delayed are also observed, providing indirect evidence that family structure influences grade repetition as well as enrollment. Family structure also has a significant effect on school-related expenditures, although the effect is not as strong as it is with educational outcomes. Relative to children living with both genetic parents, children who live with neither genetic parent have less money spent on their school fees and transportation expenses. Children living with single mothers also have less money spent on transportation costs. No relationship was found between family structure and miscellaneous school expenses.

Children's age delay in school, while itself influenced by family structure, also exhibits independent effects on school expenditures. Students who are older for their grade receive lower expenditures for all three types of school-related expenses. Since years delayed is a proxy measure of grade repetition, this result implies that parents spend less money on schooling for children who have a history of failing. Since we know nothing about the quality of the schools the student attended previously or about prior household expenditures on education, the direction of the causal arrow remains unclear. We are unable to discern whether a student's previous failure history causes her family to spend less on her, whether her family's tendency to spend less on education has led to her increased failure rate, or whether both pathways are operating simultaneously.

In summary, the results suggest that children fare best when they live with both of their genetic parents, and they fare worst when living with neither parent. These differences across types of families remain after controlling for household socioeconomic factors, suggesting that the differential schooling outcomes are not a result of different resources across families, but rather of differences in preferences for investing in children by caretakers of differing relatedness. The results from South Africa are consistent with much previous research in other countries suggesting children have poorer educational outcomes if they do not live with both parents (e.g., Haveman and Wolfe 1995, McLanahan and Sandefur 1994), and they are consistent with an evolutionary model in which parental figures exhibit decreased levels of parental solicitude towards unrelated or more distantly related children (Daly and Wilson 1998). However, apart from living with neither parent, no single family structure is consistently associated with poorer schooling outcomes. Living with a single mother is the most common deleterious correlate (significant for four outcomes, when SES is controlled), followed by living with a stepmother (significant for two outcomes) or a single father (only once a significant predictor, in the probability of enrollment in school). Living with a mother and stepfather is never associated with

significantly worse outcomes relative to living with both genetic parents, once socioeconomic factors are controlled. Although it is important to keep in mind that self-selection may be an important issue for different family types, the results suggest that women (and their children) may obtain some benefits from remarrying. While most evolutionary models of stepfamilies emphasize the negative consequences of living with an unrelated parent, the results presented here are consistent with a more subtle evolutionary model suggesting that stepfathers invest in children as a form of mating effort, providing resources to stepchildren and their mothers as a way of obtaining mates they might not otherwise be able to procure (Anderson et al. 1999b, Anderson 2000).

Directions for future research

The results presented here point to several factors that should be addressed in future data collection. The analyses of years delayed should underscore that completion of grades is not synonymous with "years of schooling." High rates of grade repetition mean that children typically advance less than one grade for each year they are enrolled. Existing datasets in South Africa focus on grade attainment, treating it as equivalent to years of schooling and ignoring importance variance in children's ages. Emphasizing current enrollment ignores differential grade attainment of same-aged children, as well as differences in the quality of schools attended. Since school quality is likely to influence subsequent educational success, it is important to know how family structure affects the quality of the school the child attends, and whether or not there are additional effects of family structure beyond the choice of school attended.

Another limitation of the dataset is that no direct information is available about the age at which children began formal education, or how many times they repeated grades or did not enroll in school. For students who are not currently enrolled, we do not know how much time has elapsed since their last enrollment. Furthermore, the data on highest grade completed cannot distinguish between currently non-enrolled individuals who completed a grade and did not continue schooling, and those who completed a grade and enrolled in the subsequent grade, which they then failed or dropped out of.[5]

The importance of gathering longitudinal data (or at the very least, good retrospective data) must be emphasized. Better educational histories (including the age of entry into school, how many grades were failed and repeated, and how many years of non-enrollment occurred) are necessary to fully understand educational dynamics in South Africa. Data on school attendance in addition to school enrollment would also be desirable. Future researchers should distinguish between each grade completed, rather than collapsing the lowest several grades into a single response level; care should also be taken to distinguish between attending a grade and passing it.

The cross-sectional nature of existing datasets limits the interpretation of the effects of family structure on education. For example, the OHS dataset contains no information on whether a currently single parent once lived with a child's other parent. This information may be important

[5] This is especially important for assessing completion of high school; the data cannot distinguish between individuals who attended the 12th grade but did not obtain their matric, and those who stopped attending school after the 11th grade. Failure rates for the matric are significant for non-whites, but cannot be directly estimated from the current national surveys.

in terms of educational outcomes, in light of the finding that non-resident Xhosa fathers who used to live with their children spend more money on them than non-resident genetic fathers who never lived with them (Anderson, Kaplan, Lam and Lancaster 1999). The OHS contains no data on the duration of current marriages for stepfamilies, although the duration of co-residence with stepchildren has been correlated with stepfathers' investment in both the United States (Anderson et al. 1999b) and South Africa (Anderson et al. 1999a). Additionally, almost no information is available about non-resident parents; without knowing whether they have had subsequent children, as well as details of their current employment, marital status, and their level of education, we cannot fully assess the trade-offs faced by parents that influence their ability to help their children obtain educations.

Lastly, to fully understand the influence of family structure on educational outcomes it will be necessary to move beyond the mere presence or absence of parental figures. Specific measures of time and monetary allocations by resident and non-resident parents, and the contributions of various individuals towards school fees, travel expenses, uniforms and supplies, help with homework, etc., would be very valuable. Some researchers have begun to examine changes in parent-offspring relationships over time (e.g., Jones 1998), or the relationship between family structure and perceived parental involvement (Anderson, Kaplan, Lam and Lancaster 1999) or children's own attitudes towards education (Mboya 1998), but much work remains to be done. In addition, future research should examine the influence of individuals beyond genetic and stepparents, such as grandparents, aunts, uncles, foster parents, etc. Moving beyond correlations of the mere presence or absence of relatives, to a more precise understanding of precisely how family members contribute to assisting with a child's educational attainment, should be a primary goal of future research.

Conclusions

This paper uses a nationally representative South African dataset to show that family structure plays an important role in influencing whether children enroll in school, the highest grade they complete, and how far behind they are for their age. Family structure also influences the amount of money families spend on students' school-related expenses. Relative to children who live with both genetic parents, children who live with neither parent fare the worst, and children who live with single mothers frequently fare worse as well. The results also suggest that the low rate of progress through school is largely caused by failure and grade repetition, rather than late age of initial enrollment or years of non-enrollment. Thus, a student's age delay (the number of years behind she is for her current grade) serves as a proxy for previous grade repetition, and is associated with lower expenditures on schooling expenses. The existing datasets in South Africa are all limited with respect to the information they provide about education; subsequent work should collect more detailed data on educational histories, non-residential parents, and specific measures of parental investment. Hopefully the results of this paper, in addition to providing insight in their own right, will influence the research questions and methodology of subsequent researchers examining educational outcomes and inequality in South Africa and elsewhere.

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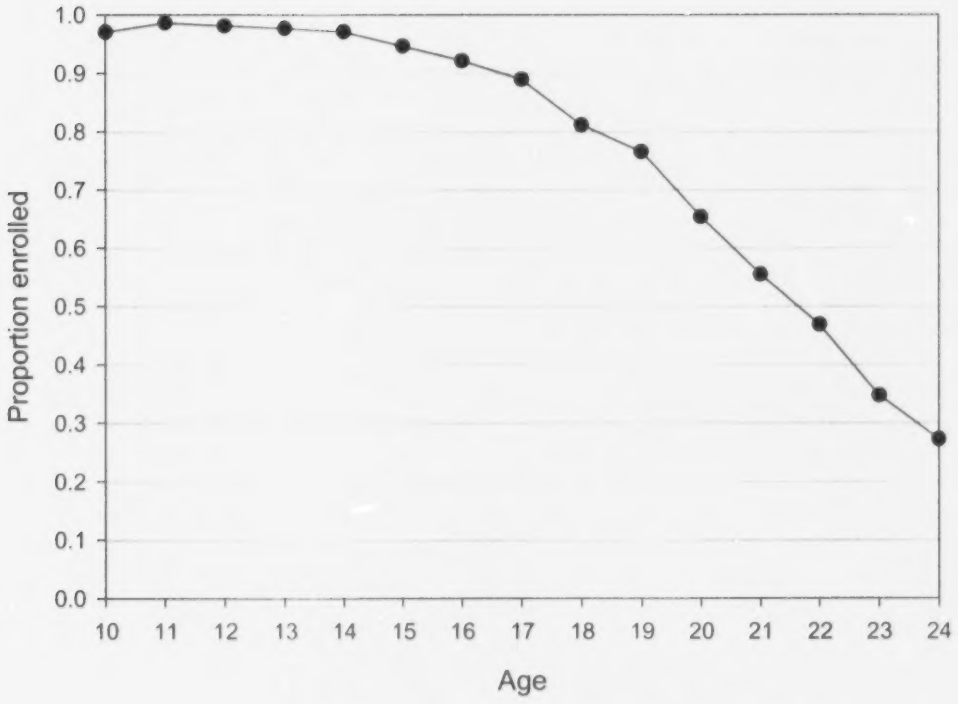

Figure 1. Proportion of non-high school graduates enrolled in school, by age.

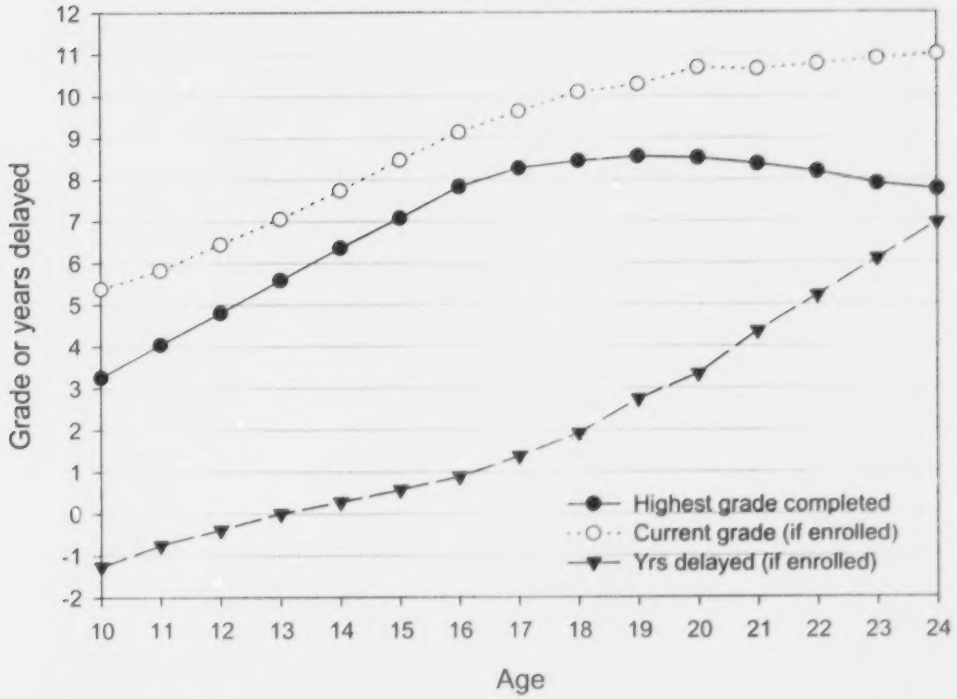

Figure 2. Highest grade completed (full sample), current grade and years delayed (enrolled sample), by age.

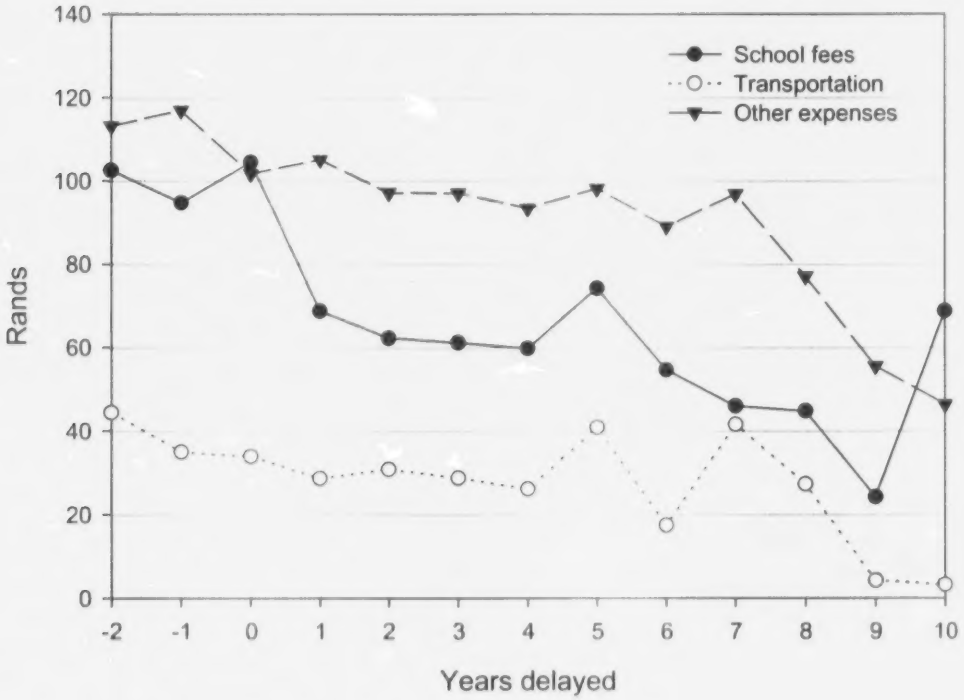

Figure 3. Financial expenditures on school expenses, by years delayed in school.

Table 1. Descriptive statistics for the sub-samples of the 1995 October Household Survey used in the analyses.

	Full sample[a]		Enrolled sample[b]	
	Mean	*Std. dev.*	*Mean*	*Std. dev.*
Child's age	16.01	(4.07)	15.51	(3.52)
Child is male (indicator)	0.479	(0.50)	0.478	(0.50)
Child lives with both genetic parents (indicator)	0.424	(0.49)	0.450	(0.50)
Child lives with genetic mother, no father (indicator)	0.200	(0.40)	0.206	(0.40)
Child lives with genetic mother and stepfather (indicator)	0.101	(0.30)	0.106	(0.31)
Child lives with genetic father, no mother (indicator)	0.017	(0.13)	0.016	(0.13)
Child lives with genetic father and stepmother (indicator)	0.011	(0.10)	0.010	(0.10)
Child lives with neither genetic parent (indicator)	0.247	(0.43)	0.212	(0.41)
Number in household ages 0-5	0.77	(0.97)	0.72	(0.93)
Number in household ages 6-17	2.50	(1.60)	2.62	(1.54)
Number in household ages 18-25	1.37	(1.17)	1.30	(1.17)
Number in household ages 26-60	1.79	(1.07)	1.83	(1.04)
Number in household ages 61+	0.40	(0.63)	0.40	(0.63)
Number in HH who listed primary activity as paid work	0.97	(0.96)	0.94	(0.92)
Monthly household income (in thousands of rands)	1.00	(1.64)	1.10	(1.77)
At least one member of the HH completed high school (indicator)	0.292	(0.46)	0.337	(0.47)
Household is in a rural district (indicator)	0.645	(0.48)	0.627	(0.48)
Family lives in a house or formal dwelling (indicator)	0.620	(0.49)	0.648	(0.48)
Household has an indoor water tap (indicator)	0.239	(0.43)	0.258	(0.44)
Household has electricity from public supply (indicator)	0.411	(0.49)	0.431	(0.50)
Household has a telephone (indicator)	0.110	(0.31)	0.127	(0.33)
Highest grade completed	6.71	(2.91)	7.41	(2.34)
Child is currently in school (indicator)	0.825	(0.38)	—	—
Years delayed in school	—	—	1.13	(2.36)
Household expenditures on student's school fees (rands)	—	—	80.69	(477.28)
Log of school fees expenditures	—	—	2.95	(1.48)
HH spent any money on this student's school fees (indicator)	—	—	0.893	(0.31)
Household expenditures on student's transportation to school (rands)	—	—	33.11	(183.50)
Log of transportation expenditures	—	—	0.42	(1.60)
HH spent any money on transportation to school (indicator)	—	—	0.106	(0.31)
HH's expenditures on other school expenses (rands)	—	—	103.73	(344.07)
Log of other school expenditures	—	—	2.39	(2.59)
HH spent any money on other school expenses (indicator)	—	—	0.499	(0.50)

a. Consists of 28,215 black South Africans ages 10-24 who have not completed high school.
b. Contains 20,695 persons from the full sample who are currently enrolled in school, and for whom years delayed in school can be calculated. (See text for further details.)

Table 2. Means (standard errors) of educational outcomes and expenditures, by type of family structure.

	Both parents	Single mother	Mother & stepfather	Single father	Father & stepmother	Neither parent	F [p]
Currently enrolled[a]	0.874	0.841 **	0.869	0.800 **	0.743 **	0.713 **	160.6
	(0.005)	(0.007)	(0.009)	(0.022)	(0.036)	(0.012)	[0.000]
Highest grade completed[a]	6.79	6.73	6.65	6.95	6.87	6.56 **	5.5
	(0.06)	(0.07)	(0.08)	(0.15)	(0.22)	(0.07)	[0.000]
Years delayed in school[b]	0.94	1.06 *	1.14 **	1.36 **	1.38 *	1.30 **	16.6
	(0.04)	(0.05)	(0.07)	(0.15)	(0.25)	(0.54)	[0.000]
School fees paid (rands)[b]	98.18	86.14	44.66 **	77.45	55.16	66.29 *	5.4
	(9.17)	(13.84)	(3.60)	(22.60)	(10.85)	(6.21)	[0.000]
Transportation expenses to school (rands)[b]	44.09	34.27	28.25 +	42.13	32.30	25.00 **	5.0
	(4.48)	(5.90)	(4.22)	(12.18)	(12.59)	(2.77)	[0.000]
Other school expenses (rands)[b]	110.82	128.72 *	101.52	93.69	120.84	97.79	3.8
	(5.54)	(16.37)	(7.54)	(10.53)	(26.23)	(4.98)	[0.002]
a. Full sample (N =28,215)	11,964	5,652	2,863	470	303	6,963	
b. Enrolled sample (N =20,695)	9,317	4,260	2,185	335	210	4,388	

Results of Bonferroni two-tailed multiple comparison tests (relative to children living with both genetic parents): + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 3. Logistic models of current enrollment in school (full sample, N = 28,215).

	Model 1			Model 2		
	Coeff.	*Std. err*	*p*	*Coeff.*	*Std. err*	*p*
Intercept	3.620	0.177	0.0000	3.101	0.216	0.0000
Child is age 10 (reference group)	—	—	—	—	—	—
Child is age 11	0.838	0.220	0.0000	0.818	0.222	0.0000
Child is age 12	0.584	0.192	0.0030	0.534	0.192	0.0060
Child is age 13	0.294	0.175	0.0940	0.238	0.177	0.1800
Child is age 14	0.126	0.173	0.4680	0.086	0.181	0.6340
Child is age 15	-0.502	0.152	0.0010	-0.580	0.154	0.0000
Child is age 16	-0.888	0.161	0.0000	-0.942	0.162	0.0000
Child is age 17	-1.299	0.145	0.0000	-1.382	0.146	0.0000
Child is age 18	-1.892	0.149	0.0000	-1.894	0.154	0.0000
Child is age 19	-2.203	0.130	0.0000	-2.209	0.131	0.0000
Child is age 20	-2.733	0.144	0.0000	-2.730	0.148	0.0000
Child is age 21	-3.150	0.142	0.0000	-3.172	0.152	0.0000
Child is age 22	-3.484	0.147	0.0000	-3.494	0.152	0.0000
Child is age 23	-3.991	0.143	0.0000	-4.001	0.152	0.0000
Child is age 24	-4.345	0.158	0.0000	-4.409	0.170	0.0000
Child is male	0.238	0.045	0.0000	0.178	0.046	0.0000
Child lives with both genetic parents (reference group)	—	—	—	—	—	—
Child lives with genetic mother, no father	-0.236	0.081	0.0040	-0.251	0.086	0.0040
Child lives with genetic mother and stepfather	-0.079	0.098	0.4210	-0.059	0.100	0.5570
Child lives with genetic father, no mother	-0.353	0.157	0.0250	-0.447	0.172	0.0100
Child lives with genetic father and stepmother	-0.729	0.221	0.0010	-0.789	0.217	0.0000
Child lives with neither genetic parent	-0.871	0.077	0.0000	-0.901	0.080	0.0000
Number in household ages 0 - 5	—	—	—	-0.208	0.024	0.0000
Number in household ages 6-17	—	—	—	0.111	0.022	0.0000
Number in household ages 18-25	—	—	—	0.033	0.028	0.2550
Number in household ages 26-60	—	—	—	0.051	0.030	0.0940
Number in household ages 61+	—	—	—	0.086	0.042	0.0410
Number in HH listing primary activity as paid work	—	—	—	-0.472	0.037	0.0000
Monthly household income (in thousands of rands)	—	—	—	0.208	0.031	0.0000
At least one member of the HH completed high school	—	—	—	0.755	0.077	0.0000
Household is in a rural district	—	—	—	-0.228	0.086	0.0080
Family lives in a house or formal dwelling	—	—	—	0.293	0.065	0.0000
Household has an indoor water tap	—	—	—	-0.044	0.079	0.5770
Household has electricity from public supply	—	—	—	0.134	0.081	0.1010
Household has a telephone	—	—	—	0.343	0.111	0.0020
	F(28,297) = 114.3, $p < 0.0001$			F(41,284) = 75.9, $p < 0.0001$		

Included but not shown: dummy variables for province of residence.
Models calculated with robust standard errors, adjusting for correlations within primary sampling units.

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Table 4. Least squares models of highest grade completed (full sample, N = 28,215).

	Model 1			Model 2			Model 3		
	Coeff.	*Std. err.*	*p*	*Coeff.*	*Std. err.*	*p*	*Coeff.*	*Std. err.*	*p*
Intercept	4.249	0.120	0.0000	3.689	0.126	0.0000	1.190	0.144	0.0000
Child is age 10 (reference group)	—	—	—	—	—	—	—	—	—
Child is age 11	0.789	0.049	0.0000	0.794	0.047	0.0000	0.749	0.045	0.0000
Child is age 12	1.541	0.053	0.0000	1.531	0.050	0.0000	1.504	0.048	0.0000
Child is age 13	2.328	0.054	0.0000	2.296	0.054	0.0000	2.290	0.052	0.0000
Child is age 14	3.107	0.055	0.0000	3.095	0.055	0.0000	3.094	0.054	0.0000
Child is age 15	3.832	0.066	0.0000	3.804	0.063	0.0000	3.872	0.058	0.0000
Child is age 16	4.557	0.056	0.0000	4.542	0.052	0.0000	4.664	0.050	0.0000
Child is age 17	5.021	0.067	0.0000	4.990	0.065	0.0000	5.209	0.059	0.0000
Child is age 18	5.226	0.071	0.0000	5.287	0.066	0.0000	5.669	0.059	0.0000
Child is age 19	5.294	0.077	0.0000	5.402	0.070	0.0000	5.920	0.062	0.0000
Child is age 20	5.319	0.089	0.0000	5.458	0.082	0.0000	6.246	0.065	0.0000
Child is age 21	5.227	0.095	0.0000	5.389	0.088	0.0000	6.436	0.079	0.0000
Child is age 22	5.044	0.109	0.0000	5.220	0.104	0.0000	6.476	0.091	0.0000
Child is age 23	4.790	0.116	0.0000	5.009	0.111	0.0000	6.567	0.094	0.0000
Child is age 24	4.633	0.132	0.0000	4.821	0.126	0.0000	6.569	0.112	0.0000
Child is male	-0.329	0.034	0.0000	-0.362	0.032	0.0000	-0.417	0.029	0.0000
Child lives with both genetic parents (reference group)	—	—	—	—	—	—	—	—	—
Child lives with genetic mother, no father	-0.080	0.056	0.1530	-0.107	0.052	0.0420	-0.032	0.047	0.4970
Child lives with genetic mother and stepfather	-0.115	0.067	0.0860	-0.009	0.066	0.8870	0.009	0.060	0.8840
Child lives with genetic father, no mother	-0.051	0.126	0.6870	-0.184	0.125	0.1410	-0.073	0.115	0.5250
Child lives with genetic father and stepmother	-0.353	0.200	0.0790	-0.339	0.180	0.0600	-0.117	0.155	0.4500
Child lives with neither genetic parent	-0.497	0.058	0.0000	-0.511	0.057	0.0000	-0.230	0.050	0.0000
Number in household ages 0 - 5	—	—	—	-0.148	0.019	0.0000	-0.089	0.018	0.0000
Number in household ages 6-17	—	—	—	-0.002	0.014	0.9030	-0.035	0.013	0.0050
Number in household ages 18-25	—	—	—	-0.096	0.018	0.0000	-0.107	0.017	0.0000
Number in household ages 26-60	—	—	—	-0.039	0.022	0.0870	-0.068	0.020	0.0010
Number in household ages 61+	—	—	—	-0.004	0.029	0.9040	-0.048	0.027	0.0730
Number in HH listing primary activity as paid work	—	—	—	-0.191	0.032	0.0000	-0.056	0.028	0.0500
Monthly household income (in thousands of rands)	—	—	—	0.099	0.015	0.0000	0.069	0.014	0.0000
At least one member of the HH completed high school	—	—	—	0.908	0.042	0.0000	0.741	0.039	0.0000
Household is in a rural district	—	—	—	-0.331	0.061	0.0000	-0.252	0.056	0.0000
Family lives in a house or formal dwelling	—	—	—	0.331	0.057	0.0000	0.250	0.050	0.0000
Household has an indoor water tap	—	—	—	0.055	0.053	0.3060	0.064	0.049	0.1930
Household has electricity from public supply	—	—	—	0.171	0.065	0.0080	0.145	0.058	0.0140
Household has a telephone	—	—	—	0.169	0.055	0.0020	0.099	0.051	0.0510
Child is currently in school	—	—	—	—	—	—	2.706	0.078	0.0000
	$F(28,297) = 503.2$, $R^2 = 0.409$, $p < 0.0001$			$F(41,284) = 564.9$, $R^2 = 0.458$, $p < 0.0001$			$F(42,283) = 906.4$, $R^2 = 0.538$, $p < 0.0001$		

Included but not shown: dummy variables for child's province of residence.

Models calculated with robust standard errors, adjusting for correlations within primary sampling units.

Table 5. Least squares models of the number of years delayed in school (enrolled sample, N = 20,695).

	Model 1			Model 2		
	Coeff.	*Std. err.*	*p*	*Coeff.*	*Std. err.*	*p*
Intercept	-1.810	0.072	0.0000	-1.482	0.084	0.0000
Child is age 10 (reference group)	—	—	—	—	—	—
Child is age 11	0.484	0.0435	0.0000	0.447	0.046	0.0000
Child is age 12	0.848	0.0419	0.0000	0.808	0.043	0.0000
Child is age 13	1.217	0.0474	0.0000	1.178	0.048	0.0000
Child is age 14	1.481	0.0499	0.0000	1.428	0.051	0.0000
Child is age 15	1.766	0.0661	0.0000	1.720	0.064	0.0000
Child is age 16	2.103	0.0593	0.0000	2.051	0.057	0.0000
Child is age 17	2.565	0.0612	0.0000	2.519	0.061	0.0000
Child is age 18	3.079	0.0604	0.0000	2.997	0.057	0.0000
Child is age 19	3.932	0.0638	0.0000	3.824	0.060	0.0000
Child is age 20	4.481	0.0588	0.0000	4.370	0.056	0.0000
Child is age 21	5.541	0.0710	0.0000	5.419	0.071	0.0000
Child is age 22	6.368	0.0716	0.0000	6.268	0.073	0.0000
Child is age 23	7.243	0.0693	0.0000	7.115	0.070	0.0000
Child is age 24	8.094	0.0881	0.0000	7.983	0.084	0.0000
Child is male	0.296	0.025	0.0000	0.311	0.024	0.0000
Child lives with both genetic parents (reference group)	—	—	—	—	—	—
Child lives with genetic mother, no father	0.067	0.034	0.0500	0.058	0.032	0.0730
Child lives with genetic mother and stepfather	0.145	0.043	0.0010	0.055	0.043	0.1990
Child lives with genetic father, no mother	0.112	0.111	0.3120	0.192	0.105	0.0690
Child lives with genetic father and stepmother	0.201	0.148	0.1750	0.189	0.138	0.1740
Child lives with neither genetic parent	0.156	0.038	0.0000	0.141	0.038	0.0000
Number in household ages 0 - 5	—	—	—	0.085	0.015	0.0000
Number in household ages 6-17	—	—	—	0.031	0.010	0.0020
Number in household ages 18-25	—	—	—	0.094	0.013	0.0000
Number in household ages 26-60	—	—	—	0.049	0.014	0.0010
Number in household ages 61+	—	—	—	0.053	0.021	0.0110
Number in HH listing primary activity as paid work	—	—	—	0.035	0.022	0.1050
Monthly household income (in thousands of rands)	—	—	—	-0.047	0.012	0.0000
At least one member of the HH completed high school	—	—	—	-0.505	0.030	0.0000
Household is in a rural district	—	—	—	0.080	0.043	0.0610
Family lives in a house or formal dwelling	—	—	—	-0.152	0.034	0.0000
Household has an indoor water tap	—	—	—	-0.139	0.038	0.0000
Household has electricity from public supply	—	—	—	-0.058	0.046	0.2110
Household has a telephone	—	—	—	-0.094	0.036	0.0090
	$F(28,296) = 1087.1$, $R^2 = 0.612$, $p < 0.0001$			$F(41,283) = 843.5$, $R^2 = 0.636$, $p < 0.0001$		

Included but not shown: dummy variables for child's province of residence

Models calculated with robust standard errors, adjusting for correlations within primary sampling units.

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Table 6. Tobit models of logged expenditures on school fees (enrolled sample, N = 20,695).

	Model 1			Model 2			Model 3		
	Coeff.	*Std. error*	*p*	*Coeff.*	*Std. error*	*p*	*Coeff.*	*Std. error*	*p*
Intercept	2.559	0.228	0.0000	2.418	0.234	0.0000	2.231	0.231	0.0000
Child is age 10 (reference group)	—	—	—	—	—	—	—	—	—
Child is age 11	0.068	0.056	0.2220	0.108	0.052	0.0390	0.146	0.054	0.0070
Child is age 12	0.140	0.052	0.0080	0.185	0.052	0.0000	0.278	0.051	0.0000
Child is age 13	0.214	0.047	0.0000	0.261	0.045	0.0000	0.404	0.050	0.0000
Child is age 14	0.384	0.061	0.0000	0.430	0.059	0.0000	0.605	0.062	0.0000
Child is age 15	0.432	0.055	0.0000	0.479	0.053	0.0000	0.691	0.060	0.0000
Child is age 16	0.568	0.061	0.0000	0.616	0.060	0.0000	0.871	0.067	0.0000
Child is age 17	0.581	0.061	0.0000	0.636	0.059	0.0000	0.949	0.071	0.0000
Child is age 18	0.596	0.069	0.0000	0.634	0.069	0.0000	1.009	0.082	0.0000
Child is age 19	0.709	0.062	0.0000	0.772	0.061	0.0000	1.262	0.078	0.0000
Child is age 20	0.653	0.073	0.0000	0.723	0.071	0.0000	1.278	0.102	0.0000
Child is age 21	0.606	0.089	0.0000	0.685	0.090	0.0000	1.373	0.118	0.0000
Child is age 22	0.506	0.111	0.0000	0.576	0.106	0.0000	1.351	0.137	0.0000
Child is age 23	0.717	0.108	0.0000	0.802	0.109	0.0000	1.676	0.150	0.0000
Child is age 24	0.381	0.156	0.0150	0.462	0.155	0.0030	1.416	0.184	0.0000
Child is male	-0.019	0.022	0.3750	-0.023	0.022	0.2810	0.016	0.021	0.4490
Child lives with both genetic parents (reference group)	—	—	—	—	—	—	—	—	—
Child lives with genetic mother, no father	-0.117	0.044	0.0090	-0.078	0.046	0.0930	-0.070	0.046	0.1290
Child lives with genetic mother and stepfather	-0.037	0.073	0.6080	0.009	0.069	0.8980	0.016	0.069	0.8150
Child lives with genetic father, no mother	-0.078	0.119	0.5110	-0.136	0.122	0.2650	-0.112	0.119	0.3480
Child lives with genetic father and stepmother	-0.069	0.137	0.6150	-0.059	0.137	0.6650	-0.036	0.137	0.7920
Child lives with neither genetic parent	-0.142	0.048	0.0030	-0.128	0.049	0.0090	-0.110	0.049	0.0250
Number in household ages 0 - 5	—	—	—	0.011	0.020	0.5620	0.022	0.019	0.2510
Number in household ages 6-17	—	—	—	-0.048	0.013	0.0000	-0.044	0.013	0.0010
Number in household ages 18-25	—	—	—	-0.048	0.016	0.0030	-0.036	0.016	0.0260
Number in household ages 26-60	—	—	—	-0.102	0.021	0.0000	-0.096	0.021	0.0000
Number in household ages 61 +	—	—	—	-0.057	0.034	0.0930	-0.050	0.034	0.1410
Number in HH listing primary activity as paid work	—	—	—	-0.028	0.031	0.3520	-0.024	0.030	0.4260
Monthly household income (in thousands of rands)	—	—	—	0.105	0.016	0.0000	0.099	0.016	0.0000
At least one member of the HH completed high school	—	—	—	0.227	0.045	0.0000	0.162	0.045	0.0000
Household is in a rural district	—	—	—	0.084	0.074	0.2560	0.093	0.073	0.2010
Family lives in a house or formal dwelling	—	—	—	0.034	0.047	0.4690	0.015	0.046	0.7520
Household has an indoor water tap	—	—	—	0.011	0.077	0.8840	-0.006	0.076	0.9350
Household has electricity from public supply	—	—	—	0.056	0.053	0.2910	0.048	0.053	0.3630
Household has a telephone	—	—	—	0.174	0.086	0.0440	0.162	0.086	0.0590
Number of years delayed in school	—	—	—	—	—	—	-0.128	0.012	0.0000
	F(28,296) = 14.6, $p < 0.0001$			F(41,283) = 17.2, $p < 0.0001$			F(42,282) = 20.6, $p < 0.0001$		

Included but not shown: dummy variables for child's province of residence.

Models calculated with robust standard errors, adjusting for correlations within primary sampling units.

Table 7. Tobit models of logged expenditures on transportation to school (enrolled sample, N = 20,695).

	Model 1			Model 2			Model 3		
	Coeff.	*Std. error*	*p*	*Coeff.*	*Std. error*	*p*	*Coeff.*	*Std. error*	*p*
Intercept	-6.027	0.804	0.0000	-7.166	1.058	0.0000	-7.926	1.074	0.0000
Child is age 10 (reference group)	—	—	—	—	—	—	—	—	—
Child is age 11	-0.553	0.588	0.3470	-0.093	0.579	0.8730	0.040	0.587	0.9460
Child is age 12	-0.174	0.503	0.7290	0.419	0.481	0.3840	0.716	0.517	0.1670
Child is age 13	-0.268	0.540	0.6210	0.253	0.523	0.6290	0.679	0.576	0.2390
Child is age 14	0.554	0.597	0.3550	1.073	0.583	0.0670	1.621	0.644	0.0120
Child is age 15	1.163	0.498	0.0200	1.607	0.499	0.0010	2.283	0.566	0.0000
Child is age 16	1.497	0.506	0.0030	1.997	0.500	0.0000	2.877	0.576	0.0000
Child is age 17	1.912	0.587	0.0010	2.490	0.578	0.0000	3.584	0.676	0.0000
Child is age 18	2.401	0.533	0.0000	3.006	0.539	0.0000	4.382	0.682	0.0000
Child is age 19	1.772	0.591	0.0030	2.610	0.588	0.0000	4.477	0.741	0.0000
Child is age 20	2.848	0.580	0.0000	3.659	0.573	0.0000	5.987	0.775	0.0000
Child is age 21	4.017	0.677	0.0000	4.913	0.660	0.0000	8.074	0.877	0.0000
Child is age 22	3.580	0.737	0.0000	4.490	0.728	0.0000	8.468	0.980	0.0000
Child is age 23	3.623	0.763	0.0000	4.426	0.703	0.0000	8.434	0.966	0.0000
Child is age 24	2.003	0.996	0.0450	2.986	0.995	0.0030	7.444	1.276	0.0000
Child is male	-0.703	0.200	0.0010	-0.736	0.195	0.0000	-0.561	0.194	0.0040
Child lives with both genetic parents (reference group)	—	—	—	—	—	—	—	—	—
Child lives with genetic mother, no father	-1.505	0.439	0.0010	-1.055	0.442	0.0180	-1.022	0.441	0.0210
Child lives with genetic mother and stepfather	-0.722	0.514	0.1610	0.021	0.500	0.9660	0.066	0.502	0.8950
Child lives with genetic father, no mother	-0.734	1.122	0.5140	-0.887	1.170	0.4490	-0.789	1.164	0.4980
Child lives with genetic father and stepmother	0.439	1.270	0.7300	0.565	1.184	0.6330	0.673	1.183	0.5700
Child lives with neither genetic parent	-1.609	0.382	0.0000	-1.143	0.382	0.0030	-1.071	0.380	0.0050
Number in household ages 0 - 5	—	—	—	0.107	0.169	0.5260	0.153	0.168	0.3640
Number in household ages 6-17	—	—	—	-0.235	0.107	0.0290	-0.214	0.107	0.0470
Number in household ages 18-25	—	—	—	-0.376	0.148	0.0110	-0.328	0.149	0.0290
Number in household ages 26-60	—	—	—	-0.570	0.172	0.0010	-0.537	0.173	0.0020
Number in household ages 61+	—	—	—	-0.482	0.272	0.0770	-0.449	0.273	0.1010
Number in HH listing primary activity as paid work	—	—	—	-0.150	0.210	0.4760	-0.130	0.213	0.5410
Monthly household income (in thousands of rands)	—	—	—	0.759	0.088	0.0000	0.733	0.088	0.0000
At least one member of the HH completed high school	—	—	—	1.182	0.361	0.0010	0.925	0.355	0.0100
Household is in a rural district	—	—	—	-0.445	0.620	0.4730	-0.445	0.625	0.4760
Family lives in a house or formal dwelling	—	—	—	-1.032	0.433	0.0180	-1.108	0.433	0.0110
Household has an indoor water tap	—	—	—	0.717	0.509	0.1600	0.644	0.504	0.2030
Household has electricity from public supply	—	—	—	0.880	0.499	0.0790	0.806	0.495	0.1050
Household has a telephone	—	—	—	0.632	0.345	0.0680	0.598	0.345	0.0840
Number of years delayed in school	—	—	—	—	—	—	-0.569	0.090	0.0000
	F(28,296) = 16.1, $p < 0.0001$			F(41,283) = 18.8, $p < 0.0001$			F(42,282) = 18.9, $p < 0.0001$		

Included but not shown: dummy variables for child's province of residence.
Models calculated with robust standard errors, adjusting for correlations within primary sampling units.

Table 8. Tobit models of logged expenditures on other school costs (enrolled sample, N = 20,695).

	Model 1			Model 2			Model 3		
	Coeff.	*Std. error*	*p*	*Coeff.*	*Std. error*	*p*	*Coeff.*	*Std. error*	*p*
Intercept	1.863	0.367	0.0000	1.219	0.454	0.0080	1.014	0.457	0.0270
Child is age 10 (reference group)	—	—	—	—	—	—	—	—	—
Child is age 11	0.177	0.184	0.3360	0.255	0.182	0.1630	0.217	0.196	0.2710
Child is age 12	-0.056	0.154	0.7190	0.003	0.152	0.9860	-0.011	0.165	0.9450
Child is age 13	0.329	0.175	0.0620	0.410	0.172	0.0180	0.425	0.205	0.0390
Child is age 14	0.308	0.165	0.0630	0.374	0.162	0.0220	0.438	0.192	0.0230
Child is age 15	0.210	0.175	0.2310	0.285	0.172	0.0980	0.392	0.213	0.0660
Child is age 16	0.404	0.158	0.0110	0.482	0.160	0.0030	0.628	0.206	0.0030
Child is age 17	0.250	0.167	0.1360	0.345	0.160	0.0320	0.532	0.217	0.0150
Child is age 18	0.477	0.176	0.0070	0.539	0.177	0.0030	0.787	0.257	0.0020
Child is age 19	0.373	0.184	0.0440	0.454	0.187	0.0160	0.859	0.250	0.0010
Child is age 20	0.396	0.220	0.0730	0.505	0.220	0.0230	1.022	0.313	0.0010
Child is age 21	-0.069	0.248	0.7810	0.053	0.247	0.8300	0.852	0.334	0.0110
Child is age 22	0.188	0.255	0.4600	0.304	0.255	0.2330	1.098	0.353	0.0020
Child is age 23	0.216	0.292	0.4600	0.307	0.289	0.2880	1.241	0.396	0.0020
Child is age 24	0.479	0.394	0.2250	0.579	0.393	0.1420	1.609	0.473	0.0010
Child is male	-0.022	0.072	0.7570	-0.021	0.072	0.7650	0.023	0.071	0.7410
Child lives with both genetic parents (reference group)	—	—	—	—	—	—	—	—	—
Child lives with genetic mother, no father	0.100	0.139	0.4730	0.220	0.139	0.1160	0.228	0.140	0.1040
Child lives with genetic mother and stepfather	0.301	0.266	0.2590	0.398	0.255	0.1190	0.407	0.253	0.1090
Child lives with genetic father, no mother	0.001	0.354	0.9970	-0.033	0.352	0.9250	-0.008	0.350	0.9810
Child lives with genetic father and stepmother	0.020	0.481	0.9670	0.062	0.483	0.8990	0.084	0.480	0.8600
Child lives with neither genetic parent	-0.089	0.177	0.6170	-0.079	0.183	0.6650	-0.060	0.182	0.7440
Number in household ages 0 - 5	—	—	—	0.030	0.070	0.6710	0.042	0.070	0.5470
Number in household ages 6-17	—	—	—	-0.088	0.046	0.0560	-0.083	0.046	0.0690
Number in household ages 18-25	—	—	—	-0.067	0.056	0.2260	-0.055	0.056	0.3270
Number in household ages 26-60	—	—	—	-0.125	0.069	0.0700	-0.118	0.069	0.0860
Number in household ages 61+	—	—	—	0.163	0.093	0.0790	0.171	0.092	0.0650
Number in HH listing primary activity as paid work	—	—	—	0.002	0.097	0.9810	0.008	0.098	0.9370
Monthly household income (in thousands of rands)	—	—	—	0.213	0.048	0.0000	0.206	0.048	0.0000
At least one member of the HH completed high school	—	—	—	-0.057	0.142	0.6880	-0.129	0.143	0.3700
Household is in a rural district	—	—	—	0.732	0.232	0.0020	0.740	0.231	0.0010
Family lives in a house or formal dwelling	—	—	—	0.437	0.204	0.0330	0.415	0.205	0.0440
Household has an indoor water tap	—	—	—	-0.461	0.270	0.0890	-0.480	0.269	0.0750
Household has electricity from public supply	—	—	—	0.349	0.225	0.1220	0.339	0.225	0.1340
Household has a telephone	—	—	—	0.264	0.214	0.2180	0.251	0.215	0.2430
Number of years delayed in school	—	—	—	—	—	—	-0.142	0.040	0.0000
	$F(28,296) = 7.5$, $p < 0.0001$			$F(41,283) = 7.5$, $p < 0.0001$			$F(42,282) = 7.9$, $p < 0.0001$		

Included but not shown: dummy variables for child's province of residence.
Models calculated with robust stand. rd errors, adjusting for correlations within primary sampling units.